

## **REMARKS**

With careful attention to the Examiner's comments in the Office Action, the Application has been amended to place it in condition for allowance. The remarks presented herein are believed to be fully responsive to the Office Action.

### **Status of the Claims**

Claims 1, 3 and 5-14 are pending in the present application.

## **CLAIM REJECTIONS**

### **A. Claim Rejections under 35 U.S.C. § 112**

The Office Action states that claims 1, 3 and 5-14 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The essential question presented is whether the limitation "a third step of releasing nitrogen from the second nitride semiconductor epitaxial layer by collectively increasing a temperature of the first nitride semiconductor epitaxial layer, the second nitride semiconductor epitaxial layer and the first nitride semiconductor epitaxial layer within a growth chamber" is supported by the written description.

However, the disclosure of a "growth chamber" can be clearly seen based on two examples From Paragraphs [0021] to [0027]. In Paragraphs [0021] to [0026], one example is explained as follows:

[0021] Referring to FIG. 1, a nitride semiconductor epitaxial layer 110 is grown on a substrate 100. ...

[0022] Referring to FIG. 2, a nitride semiconductor epitaxial layer 120 that can be converted to a metal phase if the temperature is raised is grown on the nitride semiconductor epitaxial layer 110. ...A step of growing the nitride semiconductor epitaxial layer 120 can be performed at a relatively low temperature of 300° to 800°. Thus after the nitride semiconductor epitaxial layer 110... is grown at a growth temperature, the growth temperature is lowered,...

[0023] ...a nitride semiconductor epitaxial layer 130 is grown on the nitride semiconductor epitaxial layer 120, for example, at a temperature similar to a growth temperature in the step of growing the nitride semiconductor epitaxial layer 120, i.e., at a temperature of 300° to 800° ....

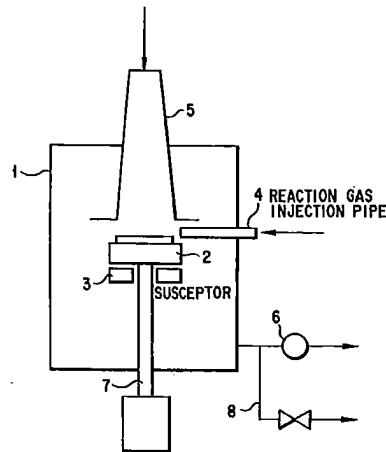
[0026] Referring to FIG. 3, a temperature is raised so that the nitride semiconductor epitaxial layer 120 can be converted to a metal phase. ...At this time, a temperature can be raised to about 900°.

In Paragraph [0027], the second example is explained as follows:

[0027] ...the nitride semiconductor epitaxial layer 130 is patterned to have an appropriate shape, some of the surface of the nitride semiconductor epitaxial layer 120 is exposed to environment of the growth chamber. It is thus possible to make the process of converting to the metal layer faster since discharge of nitrogen becomes faster.

Based on the second example, it can be seen that the conversion process of the first example is performed in the growth chamber. Indeed, the growth chamber is referenced in Paragraph [0027] as "**the** growth chamber." Though this was the first mention of a growth chamber in the specification, use of the word "the" (rather than "a") indicates that the growth chamber was in use in the first example of Paragraphs [0021] through [0026].

The growth chamber is usually a MOCVD apparatus having a below-illustrated structure:



This figure is captured from US Patent No. 5,290,393 to Nakamura, which is cited in Paragraph [0003] as a background art reference. The Nakamura reference is related to a method of growing a buffer layer. *See Claim 1* of Nakamura. This growth method is identical to the growth method of the present first nitride semiconductor epitaxial layer 110. For both methods, the buffer layer or the first nitride semiconductor epitaxial layer is grown by two steps. *See Paragraph [0021]*.

In the above figure, the temperature of a reactor or growth chamber 1 is controlled by a heater 3. *See "Example 1"* of Nakamura. The Nakamura patent is one of the most important inventions in the LED field, as is evidenced by the more than 170 patents which cite Nakamura.

Therefore, a person of ordinary skill in the art can easily understand that "raising the temperature at a point in the growth chamber" means "heating the heater at a target point corresponding to the point, so that the temperature of the nitride semiconductor layers is increased collectively." The expression "by collectively increasing a temperature ... within a growth chamber" would be understood as differentiating this limitation from the conversion by laser beams which are focused onto a specific layer to be converted.

Returning to the first example, at step 1, the first nitride semiconductor epitaxial layer 110 is grown on a substrate 100. *See Paragraph [0021]*. At step 2, after the first nitride semiconductor epitaxial layer 110 is grown at a growth temperature, the growth temperature is lowered to 300° to 800° for the growth of the second nitride semiconductor layer 120. *See Paragraph [0022]*. At step 3, the third nitride semiconductor epitaxial layer 130 is grown at a temperature similar to a growth temperature in the step of growing the second nitride semiconductor epitaxial layer 120, i.e., at a temperature of 300° to 800°. *See Paragraph [0023]*. Finally, at step 4, the temperature is raised so that the second nitride semiconductor epitaxial layer 120 can be converted to a metal phase. At this time, the temperature can be raised to about 900°. *See Paragraph [0026]*.

In this sequence of steps, there is no reason to interpret the meaning of "raising the temperature" in step 4 differently with those in steps 1, 2 and 3. Further, there is no reason to interpret the meaning of "raising the temperature" in step 4 as "raising the temperature by laser beams." A person of ordinary skill in the art would understand "raising the temperature" in the growth chamber in step 4 is the same as with steps 1, 2 and 3.

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Amendment After Final

Therefore, it would have been understood by one of ordinary skill in the art that the temperature of the first, second and third nitride semiconductor epitaxial layers is increased by "raising temperature in step 4 in the growth chamber," and that this limitation is supported by the written description, particularly in the context of discriminating the present invention from the conversion by laser beams.

If any issue regarding the allowability of any of the pending claims in the present application could be readily resolved, or if other action could be taken to further advance this application such as an Examiner's amendment, or if the Examiner should have any questions regarding the present amendment, it is respectfully requested that the Examiner please telephone Applicant's undersigned attorney in this regard.

Respectfully submitted,

Date: 2/3/11

  
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